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CONTACT DUPLICATING AND RESEAU PRINTER

AND

HIGH RESOLUTION STEP AND REPEAT PRINTER

NINTH MONTHLY LETTER REPORT

April 10, 1965

Period: March 1, 1965 to April 1, 1965



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NGA Review
Complete

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1.0 CONTACT DUPLICATING AND RESEAU PRINTER

1.1 Purpose

The overall objective of the current contract is the design, fabrication, test, and delivery in fifteen months of a photographic Step and Repeat Contact Duplicating and Reseau Printer. Prime design goals are high speed automatic operation, variable format capability, and high resolution with minimum film distortion or damage. The deliverable equipment will be suitable for operational use. The Printer will accommodate films of 70 mm to 9-1/2" width with frame lengths up to 30 inches and will offer operation in the Reseau mode and Selective mode as options.

1.2 Activity of this Report Period

The industrial design has been modified by [] to be more consistent with a clean room environment. The pre-filter and absolute filter have now been incorporated into a hinged-top lid for the printer so that the airflow will take place downward through the printer base and exhaust into the ductwork. The control panel area has been modified to exclude ledges, corners, and other possible dust-collecting surfaces.

The Reseau Grid specifications were defined in detail in a meeting with [] on March 19, 1965. Procurement of the glass blanks for the Reseau and plain platens has been initiated. A large quantity of optical quality glass will be inspected, in

order to select blanks meeting the requirements for minimum bubbles, striae and other imperfections.

Design of the Reseau Grid binding frame, locator pins, and clamping device has been resolved and detailed drawings are in process.

A test plan has been devised for test and demonstration of the printer, and is now being reviewed prior to release to the technical monitors.

A sample of Reseau Grid lines and typical numbers has been obtained, and will be printed through various aerial negatives to demonstrate line quality and legibility when printed through various negative densities.

Circuits have been breadboarded for the exposure control sensing system. Although a functioning circuit exists, improvements are being investigated to upgrade system performance.

Fabrication of the welded machine frame has been initiated and is proceeding satisfactorily. Rectangular aluminum extrusion stock is being used, and will be heliarc welded after assembly. Joints will be coved to facilitate internal cleaning.

On March 5th and 23rd meetings were held with the technical monitors to review the Design Plan. Verbal approval of the Design Plan, as amended on March 11 and March 19, was received at the March 23rd meeting.

Request for approval to use for industrial design of the Preview and Punch Device has been submitted.

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1.3 Plans for Next Report Period

Pending contractual approval of the Design Plan, final design and fabrication of the deliverable printer will be initiated.

Testing will continue on the full scale exposure system, and a final selection of sensing components and circuitry will be made.

The test plan will be reviewed and test target design will be started.

1.4 Problems

Immediate approval of the Design Plan is required in order to avoid possible delivery delays and the possibility of additional costs.

1.5 Documentation

Agreement has been reached with the technical monitors that the printer will handle all film sizes from 70 mm to 9-1/2 inches wide. A two-cell photocell system from 70 mm to 5 inch sizes will be used even though it is understood that optimum reliability of edge frame sensing may not be attained at all the in-between sizes.

Maximum reliability will, however, still be maintained at 70 mm, 5 inches, and all sizes from 5 inches to 9-1/2 inches.

1.6 Questions Outstanding

There are no outstanding questions.

2.0 HIGH RESOLUTION STEP AND REPEAT PRINTER

2.1 Purpose

The purpose of this effort is to design, fabricate, test and deliver in twenty months a high-precision Step and Repeat Photographic Contact Printer. This Printer will be capable of producing photographic contact prints of the highest possible quality, resolution and acutance from roll films of width varying from 70 mm to 9-1/2 inches and in preselected frame lengths up to a maximum of 30 inches.

2.2 Activity of this Report Period

Design and drafting is nearing completion for all breadboard phases, and procurement and fabrication of the breadboard is well under way. The following is a description of the progress made in each breadboard area to date.

2.2.1 Exposure Control and Light Source

The parts for the lamphouse assembly are being fabricated and will be ready for assembly early in April, along with the optical components.

All test aperture lamps have been procured, and energy tests have indicated that sufficient U.V. energy is available for exposure. Uniformity and spectral distribution tests will be performed in April along with completion of the modulation circuitry. Early tests of modulation indicated partial success; however, reduced ripple, increased modulation range, and improved frequency response are immediate goals.

The sensing circuits and log amplifier circuits have been completed and are ready for use. The red aperture lamps have been examined for energy output, and found to be satisfactory.

2.2.2 Code Reader and Edge Sensor

Yaw tolerance measurements were performed on all photocells, and tests indicate that the Texas Instruments phototransistor is best suited for this application.

An amplifying stage for the Texas Instrument phototransistor was designed, and successfully used to trigger the SG-43 gate circuit.

The edge sensor station was installed, and qualitative tests were performed using the Texas Instruments phototransistor as a transducer in a selective reflection set-up. The signal swing appears to be adequate; however, further tests are being planned to improve performance.

2.2.3 Film Transport

Engineering drawing and design has been completed, vendor procurement is well underway, and many components have been received.

The breadboard structural frame assembly has been started, and will continue as purchased and fabricated parts are received.

Modified testing of the film storage loops will commence early in April, and full scale testing of the transport will be underway by mid-month.

The response of the stepper-motor is still being measured, but recent results have been favorable and indicate that this device can be successfully used in the capstan drive. A backup D.C. servo circuit and motor have been selected as an alternative approach.

2.2.4 Electronic Packaging

Design of the universal board for the integrated circuits has been completed, and orders have been released for the hole template and IC welding. The printed circuit artwork has been completed, and is being inspected prior to release for board fabrication. It is expected that three boards will be fabricated and delivered to for testing and checkout early in April.

Each board, in a unique design, will contain 10 integrated circuit "flat-packs" welded into place, and will permit 60 contacts when the front and rear circuit elements are connected. The universal board will permit a variety of circuits to be used, and will eliminate the need for fabrication of different boards for specific circuits. Upon completion of the circuit boards, they will be connected for test in the number-of-prints select logic circuitry.

2.2.5 Film Gate and Lamp Drive

This month saw the completion of the design and drafting effort on the Film Gate and Scan Drive. Drawings were generated to cover fabrication and assembly of two Vacuum Capstans, a Film

Cleaning Unit, a Lamp House, a Gate and Transport Support Frame, a Rolling Air Bag Gate and a Scan Drive.

Orders have been placed for all purchase parts and vendor-made fabricated parts. Delivery of purchased parts has been satisfactory with the exception of the plastic extrusion for the rolling air bag, which was due March 15 and the manufacturer now will deliver by April 1. This should not cause schedule slippage.

Activity in April will be devoted to assembly and the beginning of testing.

2.3 Plans for Next Report Period

Breadboard assembly should be nearing completion and testing started for most phases. Film transport, gate and lamp drive assemblies should be completed, and testing underway.

2.4 Problems

At a meeting with the technical monitor on 23 March, the possibilities of government change in specification were discussed, particularly in the areas of film coding, film transport, and some of the automatic features of the printer. A complete review of these concepts is in process, and the effects upon cost and delivery schedule are being studied.

2.5 Documentation

A meeting was held with the technical monitor on 23 March to review the "Revisions to the Specification", paragraph 3.0, page 45, of the Feasibility Study Report, High Resolution Step and Repeat Contact Printer. Verbal approval of the revisions was given, with the following exceptions: paragraphs 2.1.3, 2.3.2, 2.5, 2.15, 2.23.6, and 2.26.

These exceptions will be modified and discussed with the technical monitor as soon as possible. The changes will be as follows:

<u>Ref. Paragraph</u>	<u>Anticipated Change</u>
2.1.3	Film Coding concept will be changed by technical monitor.
2.3.2	Environment: Room environment will be specified by the technical monitor. Masks will now be required along the film width, contrary to the previously agreed concept. Details will be specified by
2.15	The unexposed film and the negative film will be furnished pre-cleaned. Neither will require further cleaning in the printer.

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2.23.6 The RFI specification has been modified and will be reworded by the technical monitor.

2.25 Clarify as follows: 6' high x 8' long x 3.5' deep.

It was mutually agreed that extra glass platen planks be procured, so that, together with the platens of Printer No. 1, a cost savings may be realized.

2.6 Questions Outstanding

2.6.1 List of spool sizes (since some are not commercially available) and format dimensions to be furnished by the technical monitor. These are urgently needed to complete industrial design studies and in design considerations in film transport and masking

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there during
the week of
3 May 65.
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2.6.2 Document procurement to be furnished by the technical monitor: AD-439 600L Test and Evaluate the Kalvar 70 mm and 5 inch Roll to Roll contact Printer/Processor (EN-85). This is of particular interest because of similar collimation problems encountered with a tubular light source.

For DOD
use only.
Extracts of
paras B-2,
and G-8 made
for transmittal
to [] RFD

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2.6.3 [] submitted the Feasibility Study for the High Resolution Step and Repeat Printer on January 19, 1965. Therefore, due to this reasonable review period, [] requires the immediate approval of the Feasibility Study in order to avoid possible delivery delays, and the possibility of additional costs.

As of 29 Apr 65
letters had not
been written to
the contractor for
charges or profit
in our previous
dated 13 Apr and
16 Apr 65.
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